

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1 (Currently Amended). A frequency converter which converts a first current signal having a first frequency into a second current signal having a second frequency different from the first frequency, comprising:

adding means for adding the first current signal and a reference current signal to output a third current signal; and

passing means for passing ~~only~~ a larger current component of the third current signal to obtain the second current signal, when the third current signal includes the larger current component which is larger in magnitude than a threshold current, and blocking a smaller current component of the third current, when the third current signal includes the smaller current component which is smaller in magnitude than the threshold current.

2 (Original). A frequency converter which converts a first current signal having a first frequency into a second current signal having a second frequency different from the first frequency, comprising:

first adding means for adding the first current signal and a reference current signal to output a third current signal;

second adding means for adding a first antiphase current signal opposite in phase to the first current signal and a second antiphase current signal opposite in phase to the reference current signal to output a fourth current signal;

first current outputting means for passing only a current component of the third current signal to output a first passed current signal, when the third current signal includes the current component which is larger in magnitude than a first threshold current;

second current output means for passing only a current component of the fourth current signal to output a second passed current signal, when the fourth current signal includes the current component which is larger in magnitude than a second threshold current;  
and

third adding means for adding the first passed current signal and the second passed current signal to output the second current signal.

3 (Original). A frequency converter which converts a first current signal having a first frequency into a second current signal having a second frequency different from the first frequency, comprising:

first adding means for adding the first current signal and a reference current signal to output a third current signal;

second adding means for adding a first antiphase current signal opposite in phase to the first current signal and a second antiphase current signal opposite in phase to the reference current signal to output a fourth current signal;

third adding means for adding a first phase-shifted current signal obtained by shifting a phase of the first current signal by 90 degrees and a second phase-shifted current signal obtained by shifting a phase of the reference current signal by 90 degrees to output a fifth current signal;

fourth adding means for adding a third phase-shifted current signal obtained by shifting the phase of the first current signal by 270 degrees and a fourth phase-shifted current

signal obtained by shifting the phase of the reference current signal by 270 degrees to output a sixth current signal;

first current outputting means for passing only a current component of the third current signal to output a first passed current signal, when the third current signal includes the current component which is larger in magnitude than a first threshold current;

second current outputting means for passing only a current component of the fourth current signal to output a second passed current signal, when the fourth current signal includes the current component which is larger in magnitude than a second threshold current;

third current outputting means for passing only a current component of the fifth current signal which is larger in magnitude than a third threshold current to output a third passed current signal, when the fifth current signal includes the current component which is larger in magnitude than a third threshold current;

fourth current outputting means for passing only the current component of the sixth current signal to output a fourth passed current signal, when the sixth current signal includes the current component which is larger in magnitude than a fourth threshold current;

fifth adding means for adding the first passed current signal, the second passed current signal, the third passed current signal, and the fourth passed current signal to output the second current signal;

sixth adding means for adding the first current signal and the second antiphase current signal to output a seventh current signal;

seventh adding means for adding the first antiphase current signal and the reference current signal to output an eighth current signal;

eighth adding means for adding the first phase-shifted current signal and the fourth phase-shifted current signal to output a ninth current signal;

ninth adding means for adding the second phase-shifted current signal and the third phase-shifted current signal to output a tenth current signal;

fifth current outputting means for passing only a current component of the seventh current signal to output a fifth passed current signal, when the seventh current signal includes the current component which is larger in magnitude than a fifth threshold current;

sixth current outputting means for passing only a current component of the eighth current signal to output a sixth passed current signal, when the eighth current signal includes the current component which is larger in magnitude than a sixth threshold current;

seventh current outputting means for passing only a current component of the ninth current signal to output a seventh passed current signal, when the ninth current signal includes the current component which is larger in magnitude than a seventh threshold current;

eighth current outputting means for passing only a current component of the tenth current signal to output an eighth passed current signal, when the tenth current signal includes the current component which is larger in magnitude than a eighth threshold current; and

tenth adding means for adding the fifth passed current signal, the sixth passed current signal, the seventh passed current signal, and the eighth passed current signal to output a third antiphase current signal opposite in phase to the second current signal.

4 (Original). A frequency converter which converts a first current signal having a first frequency into a second current signal having a second frequency different from the first frequency, comprising:

adding means adding the first current signal and a reference current signal to output a third current signal;

a field effect transistor which includes a gate terminal which is grounded for radio-frequency currents, pass only a current component of the third current signal to obtain the second current signal, when the third current signal includes the current component which is larger in magnitude than a threshold current; and

a constant current source which is connected to a source terminal of the field effect transistor, and generates a current substantially equal in magnitude to the threshold current.